Saving the Endangered Fennoscandian *Alopex lagopus* SEFALO+

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Juvenile arctic fox in Helags, September 21 2004. Photo: Lars Liljemark

FIRST PROGRESS REPORT
WITH FINANCIAL SUMMARY
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Introduction

Background

The arctic fox *Alopex lagopus* is threatened to go extinct in the European Union and adjacent areas. It is a priority species according to the EC Habitat directive. The main threats are the small population size constrained by low food availability and competition from the larger red fox *Vulpes vulpes.*

The arctic fox is a circumpolar, tundra-living canid. In mainland Europe, it breeds above the tree line in the mountain tundra of Fennoscandia (Sweden, Finland, Norway, the Kola Peninsula). The breeding population reached at least 15 000 individuals in peak years in the mid-19th century. However, it suffered a drastic decline due to over-harvest by the fur industry at the beginning of the 20th century. The population has remained at a low density for over 70 years. Population estimates in 2003 totalled 150 adults, of which approximately 50 were found in Sweden, 50 in Norway, and less than 10 in Finland. From Kola, there were indications of a similar situation, suggesting a population of *ca.* 40 adults. Several factors may have contributed to the non-recovery of the arctic fox:

- *Threat 1 Low population size* The population is fragmented as large areas within its previous range are empty. Young foxes may therefore have difficulties finding a non-related partner and there is a risk of inbreeding. Further, the small population size implies that even small changes in demographic parameters or pure "accidents" can affect the risk of extinction dramatically.
- *Threat 2 Low food availability* Arctic fox breeding is strongly dependent on the availability of the main prey, lemmings and voles (*Lemmus sp., Microtus sp., Clethrionomys sp.*). These small rodents generally have a cyclical pattern of abundance with peaks every 3-4 years, followed by population lows (1-2 years.). Arctic foxes can have up to 19 young in peak years, while few or no cubs are born during lows. The rodent peaks failed to appear during the 1980s and 1990s, causing a further decline in the arctic fox population.
- *Threat 3 Competition* The red fox is a dominant competitor and a predator on arctic fox juveniles. Is has increased in numbers above the tree line in the 20th century, taking over dens and excluding the arctic fox from parts of its breeding range.
- *Threat 4 Diseases* A captive breeding programme in Sweden in the early 1990's failed due to an outbreak of fatal encephalitis. If the disease occurs in the wild population, the effects could be detrimental. Other diseases or parasites could also have serious effects on the population.
- *Threat 5 Disturbance* Disturbance at dens from hunting dogs in early autumn may cause an early juvenile emigration with subsequent higher juvenile mortality.
- *Threat 6 Hybridisation* Hybridisation with escaped farmed arctic foxes, which probably are less well adapted to natural habitats, could decrease the fitness of the wild population. Whether or not hybridisation has occurred is unknown, but farmed foxes have been observed in the wild.

Overall objectives

We will use a dynamic management approach to monitor the population and allocate conservation actions in the most efficient way. Since there are few arctic foxes, we will follow and support individuals through den surveys, radio tracking and genetic analyses. Thus, we will have an individual perspective rather than a spatial one with specified target areas.

Actions within the project targets 75% of the population in mainland Europe, totalling 100% of the Community population. The project is mainly aimed at conserving the arctic fox within the EU community. However, these foxes belong to a population where approximately half of the individuals are found in Norway. Therefore, SEFALO+ also intends to monitor the population in Norway.

The actions will increase population viability through increased reproductive output and decreased mortality for the arctic fox.

Specific objectives

- To investigate presence, breeding success and genetic substructure of the arctic fox population in Sweden, Finland and Norway through monitoring (D1, Threat 1). This action is a prerequisite for actions D2-5 and to evaluate the success of the project.
- To evaluate the need for translocation of arctic foxes within or to Fennoscandia (A3, Threat 1).
- To offer supplementary feeding to arctic foxes at inhabited dens in Sweden and Finland (D2, Threat 2) and to control red foxes in surrounding areas (D3, Threat 3).
- To monitor the arctic fox in Sweden and Finland for various diseases and identify the unknown disease causing encephalitis in captive foxes. If needed, to develop a strategy for eradication of diseases in the wild population (D4, Threat 4).
- To decrease disturbance and disseminate information to the public (D5, E1-E7, Threat 5).
- To develop a method to identify escaped farmed foxes in the wild and investigate if hybridisation with wild foxes has occurred (D1, Threat 6).
- To develop a Norwegian action plan for the arctic fox (A2) and local actions plans in Sweden and Finland. To implement the local plans within authorities to safeguard future monitoring and action programme (C1, All threats).

Expected results

- *Threat 1 Low population size* Knowledge on population size, distribution, inbreeding and Allee effects. Experience from SEFALO indicate that if actions D1-3 and D5 are combined, it is realistic to increase the number of reproducing arctic foxes over 5 years (A2, A3, C1, D1).
- *Threat 2 Low food availability* Increased number of arctic fox litters, litter size and juvenile survival (C1, D1, D2)
- *Threat 3 Competition* Reduced competition from breeding red foxes. Increased number of arctic foxes which establish territories and breed; decreased mortality (C1, D1, D3).
- *Threat 4 Diseases* Identify and screen any new virus to investigate the level of threat. If possible, treat the disease and increase survival (C1, D1, D4)
- *Threat 5 Disturbance* Reduced disturbance from hunting dogs. Understanding of threats and actions from the public (C1, D1, D5, E1-E7).
- *Threat 6 Hybridisation* Identify hybrids in the wild and suggest action (C1, D1).

Participating organisations

Stockholm University SU	Swedish Environmental Protection Agency SEPA	County Administration Board (CAB) of Jämtland	County Administration Board of Västerbotten	County Administration Board of Norrbotten	Finnish Forest Research Institute FFRI
Park and Forestry Service PFS	Norwegian Institute for Nature Research NINA	Swedish University of Agricultural Science SLU	Swedish National Veterinary Institute NVI	Lapplandsafari AB Geunja	Fjällhästen AB
Ramundberget Alpina AB	University of Iceland	Fjällräven AB	WWF Sweden	Dogman	EU Life-Nature

Summary

Overall, the project has run smoothly and according to plan. In Sweden-Finland, we see an increase in the total population size of arctic foxes for the first time since the 1980's. However, the increase has been concentrated to a core area in Swedish Jämtland, Västerbotten and southern Norrbotten, while there are no signs of a change for the better in northern Norrbotten and Finland. Actions within SEFALO and SEFALO+ have most likely contributed to the development in the south, as Swedish areas with more extensive actions are located there. Since the start of the first project phase (SEFALO) in 1998, the positive population trend has been most apparent in the Helags area where actions also have been most intense. There has been an increase in the adult breeding population and it was the only area in Sweden-Finland where arctic fox litters were born in 2002-2003. There are also indications of increased survival in the area.
In Norway, the total number of recorded arctic fox litters has been relatively stable since the start of more intense den site monitoring in the beginning of the 1980's, varying from 0-16 litters between years, with peaks in numbers of litters during lemming population peaks.

Main activities

A. Preparatory actions/ management plan preparation The project have received necessary permits. We have also, in advance, renewed a permit that was to be renewed next report period (A1, Table 1, 3). The Norwegian action plan is finished (A2, Table 1, 2).

C. Non-recurring management No actions planned or done this report period.

D. Recurring management All actions have been carried out according to approved contract.
Monitoring (D1) We surveyed 411 of 588 known dens in Sweden and Finland in winter 2004. In summer, we surveyed 465 dens in Sweden-Finland and 266 of 531 dens in Norway. We found 14 arctic fox litters in Sweden and 14 in Norway. There was no reproduction in Finland. A total of 61 cubs were ear tagged for later identification, and 6 were also fitted with radio collars. We re-sighted 9 adult foxes which had been tagged as cubs in 2000-2001. Complementary to SEFALO+, monitoring was also carried out in 2003 (Table 1-2). In 2003, there was 1 litter in Sweden and 2 in Norway.
Feeding (D2) We fed arctic foxes at 23 dens in winter 2004 and at 20 dens during summer, including most dens with arctic fox litters. Complementary to SEFALO+, feeding was also carried out in summer 2003 (Table 1-2).
Red fox control (D3) We culled a total of 197 red foxes in important arctic fox areas in winter 2004 (Table 1). This is necessary since the red fox is a dominant competitor and a predator on arctic fox cubs, and since feeding of arctic foxes (D2) may attract red foxes. Red fox control has been carried out with different methods in different areas due to differences in logistics and local attitudes. Complementary to SEFALO+, red fox control was also carried out in winter 2003 (Table 1).
Disease (D4) We have found a herpes virus which may be the cause of fatal encephalitis in captive arctic foxes. We have done an autopsy and run tests of the general health of a wild arctic fox female which was found dead. Blood samples have been taken from a few wild cubs for later analyses (Table 1).
Protection of areas around dens with cubs (D5) In 2003, we excluded the area around the single breeding den from ptarmigan hunting. In 2004, areas around 12 of 14 breeding dens were excluded from hunting (Table 1).

E. Public awareness and dissemination of results The website has been updated continuously (E1, Table 1). Information about the arctic fox and SEFALO+ was included in the fall-winter edition of the Fjällräven AB catalogue for outdoor equipment, distributed in six languages (E2, Table 1, 2). Due to a misunderstanding about the deadline for submission of texts, no information was included in the spring-summer 2004 edition of the catalogue (Table 1,2). We suggest that an information text in the catalogue in February 2003 should compensate for this. Local information addressed to wildlife tourists in the Nature Reserve of Vindelfjällen has been disseminated by local tourist operators on a person to person basis (E3, Table 1). Ramundbergets Alpina AB has built an arctic fox playground where children learn about foxes during play and distributed information about the arctic fox to their guests (E4, Table 1, 3). Results from SEFALO+ have been presented at the Sixth European Conference on Wildlife Disease Association in Uppsala, Sweden (E5). We have had continuous press contacts and SEFALO+ has been featured in papers, radio and television programmes (E6, Table 1).

F. Overall project operation Overall project operation has run smoothly. The Project leading group has had continuous contacts and produced a General Management Plan (F1, Table 1, 2). The Steering Committee met in November 2003 (F2, Table 1). The operating groups in Sweden, Finland and Norway have had meetings and continuous contacts on a person to person level to discuss how to execute actions (F3-F5).

Table 1. Actions June 1 2003 – September 30 2004. x indicates planned actions which have been executed according to the approved contract (form 22), X indicates actions executed in addition to the contract (D1-2) or earlier than planned (A1), (x) indicates a planned action which has not been executed (E2).

Action / Period	A			C	D					E							F					
	1	2	3	1	1	2	3	4	5	1	2	3	4	5	6	7	1	2	3	4	5	6
2003 Jun-Sep	x				X	X		x	x	x		x			x		x		x	x	x	
Oct-Dec								x		x	x	x	x		x		x	x	x	x	x	
2004 Jan-Mar					x	x	x	x		x		x	x		x		x		x	x	x	
Apr-Jun	X	x			x	x		x		x	(x)	x			x		x		x	x	x	
Jul-Sep					x	x		x	x	x		x			x		x		x	x	x	

Table 2. Deliverable products June 1 2003 – September 30 2004 (approved contract form 23).

Product	Action	Expected date of delivery	Date of Completion
General management plan	F1	December 2003	March 2004
Norwegian action plan	A2	April 2004	September 2003
European information, biannual	E2	November 2003 / May 2004	November 2003 / Not delivered

Table 3. Project milestones June 1 2003 – September 30 2004 (approved contract form 24).

Milestone	Action	Expected date of delivery	Date of Completion
Obtain permits necessary for actions D1 and D3	A1	September 2003	April 2004
Playground in Ramundberget	E4	December 2003	December 2003
Renew ethical permit for trapping, tagging, radio collaring and blood sampling	A1	December 2004	April 2003

Report of Activities

A. Preparatory actions, elaboration of management plans and/or of action plans

A1 Permits Monitoring (D1) involves visiting arctic fox dens, ear tagging of juveniles and radio collaring. Blood samples will be taken to screen the population for diseases (D4). Since the arctic foxs is protected, permits are needed to visit dens, to trap and tag individuals and to take blood samples. Permits are also needed for red fox control (D3). In some cases, the project will also need permits to use snowmobiles and helicopters in otherwise restricted areas.
Actions foreseen in report period Competent authorities and partners who also are competent authorities will issue the permits necessary for the project.
Progress to date The project has received necessary permits. In addition, SU has renewed the ethical permit from the Swedish National Board for Laboratory Animals for trapping, tagging, radiocollaring and blood sampling of arctic foxes in Sweden. In the approved contract, this renewal was planned for the next report period.
Variations/complications/delays None

A2 Norwegian Action Plan About half of the Fennoscandian arctic fox population is located in Norway. Actions in Norway are therefore vital for the survival of the population. The Norwegian Directorate for Nature Management (NDN) will develop a Norwegian action plan for the conservation of the arctic fox in Norway. The objective is to achieve a more favourable conservation status of the arctic fox.
Actions foreseen in report period The plan will be finished in 2004.
Progress to date The plan was finished in September 2003. Norway is a third country partner in SEFALO+. The Norwegian input according to the approved contract is therefore limited to monitoring in summer (D1; den surveys, trapping and ear tagging of arctic foxes). In the action plan, Norway aims to start conservation actions in addition to the Norwegian involvement in SEFALO+ and several research projects. The plan is enclosed to the Commission along with this report. It is also available on the Internet at http://www.dirnat.no/archive/attachments/01/53/Rappo049.pdf
Variations/complications/delays None

A3 Translocation Evaluation Report The current small population size can lead to inbreeding depression, Allee effects and fragmentation (Threat 1). Translocation of individual arctic foxes, e.g. reciprocal restocking of individuals between subpopulations or introduction of individuals from Russia, could be necessary to eliminate these problems. Monitoring (D1) will provide information on the substructure of the Fennoscandian arctic fox population. Thus, the objective with this action is for Stockholm University and the assistant project leaders to investigate the need for translocation and produce a Translocation Evaluation Report. If translocation is needed, the report will suggest appropriate methods.
Actions foreseen in report period None. The Translocation Evaluation Report is due in Dec. 2006. However, monitoring which will render data on population substructure has been performed (D1).
Progress to date See above
Variations/complications/delays None

C. Non-recurring management

C1 Implementation Conservation actions will be implemented within CABs in Sweden and PFS in Finland to ensure that they have the organisation and experience needed to continue appropriate actions also after the project ends. This is necessary since the present population size is critically low (Threat 1) and the arctic fox will need more time than this project period to recover. Further, the CABs differ in landscape and infra structure, e.g. distances between arctic fox habitat, built-up areas and roads. Thus, local Action Plans will be developed for each county to attain the goals of SEFALO+. The plans will describe local conditions regarding the distribution of arctic fox habitat and clarify how actions can be executed in each area during and after SEFALO+.
Actions foreseen in report period None. The CABs will produce Local Action Plans, with assistance from SU by December 2005. FFRI and PFS will produce a similar Action Plan for Finnish Lapland, also by December 2005.
Progress to date None
Variations/complications/delays None

D. Recurring management

D1 Monitoring Monitoring through den surveys will provide information on arctic fox presence and breeding success, food availability for arctic foxes and red fox density. This is necessary to decide when and where actions D2-D3 and D5 will be performed (Threats 2-3, 5). In addition, radio collaring and radio tracking of arctic foxes, ear tagging of juveniles and genetic analyses of faeces will resolve population size, population substructure, survival, migration rates and routes, and identify potential hybrids with farmed foxes. Radio tracking of individual arctic foxes may also be a tool to follow individual arctic foxes and support them with feeding etc. through their lifetime. During trapping and tagging of arctic foxes, it is also possible to take blood samples to screen the wild population for diseases (D4, Threat 4). In Finland and Sweden, monitoring will cover both summer and winter, while only summer surveys will be conducted in Norway. Over time, information from monitoring will be used to determine status and viability of the Fennoscandian arctic fox population and to produce the Translocation Evaluation Plan (Threat 1, A3). Genetic analyses will enable us to identify hybrids in the wild and produce a Report on the genetic structure of Fennoscandian arctic foxes (Threat 1) and a Report on genetic identification of farmed arctic foxes (Threat 6). Finally, monitoring is necessary to evaluate the project.
Actions foreseen in report period The CAB's, PFS and Finnish Forest Research Institute (FFRI) are responsible for summer and winter den surveys, tagging and radio tracking in their areas of their jurisdiction in Sweden and Finland. SU will assist in Sweden when needed. In Norway, NINA is responsible for summer surveys under SEFALO+. Monitoring should start in January 2004 according to the approved contract. Stockholm University will do genetic analyses of collected material and develop a method to identify farmed foxes, as the Report on genetic identification of farmed arctic foxes is due in July 2005. The other reports are not due until December 2006, and we will not work on them during this report period.
Progress to date Field work within the previous project SEFALO ended after summer 2002. Complementary to SEFALO+, some monitoring was still performed during winter 2002-2003 and summer 2003. To avoid a gap in reporting between SEFALO and SEFALO+, we include the results here.
Winter 2002-2003 In total, we surveyed 332 of 581 known dens in Sweden and Finland. 17 dens were inhabited by arctic foxes and 38 by red foxes (Table 1).

Summer 2003 In total, we surveyed 410 of 586 known dens in Sweden and Finland (Table 2). The availability of lemmings, the main prey of arctic foxes, was low in all areas (Table 5). As a result, there was only 1 arctic fox litter (Table 2). The litter was found in Helags, an area where both feeding (D2) and red fox control (D3) had been maintained since the end of SEFALO in 2002. In total, we found 7 red fox litters in arctic fox dens. Red foxes usually take over dens in more productive areas with alternative prey, such as voles and birds. They are therefore less reliant on lemmings than arctic foxes are. In Norway there were 494 known dens (413 arctic fox, 41 red fox and 40 dens of uncertain origin) recorded in the national database by 2003. In total, 209 of these dens were surveyed during summer 2003. Only 2 arctic fox litters were recorded and 2 red fox litters breeding in former arctic fox den sites.

Winter 2003-2004 We surveyed 411 of 588 dens in Sweden and Finland. In total, 29 dens were inhabited by arctic foxes and 46 dens by red foxes (Table 3). We estimated that there were 48-67 arctic foxes. This is an increase since the start of the first phase of the project (SEFALO, winter 1998-1999) when we estimated that there were 36-59 arctic foxes. The two winters should be relatively comparable, as lemming availability was low at both times.

Summer 2004 (Sweden and Finland) We found an additional 12 dens during summer. Thus, we surveyed 465 of 600 known dens. In Sweden, lemming availability had increased in some areas and was intermediate to high in northern Jämtland and Västerbotten (Borgafjäll, Vindelfjällen). It was lower in southern Jämtland (Helags) and Norrbotten (Table 6). We found 14 arctic fox litters and 15 red fox litters. The arctic fox litters were located in Helags (4), Sösjö-Offerdalsfjällen (1), Borgafjäll (4), Vindelfjällen (3) and in Arjeplog (2) adjacent to Vindelfjällen in southernmost Norrbotten (Fig. 1, Table 4). There were a minimum total of 102 cubs, 60 of which were trapped and ear tagged. In addition, we tagged 3 adult foxes. Later in summer we fitted 6 of the tagged cubs with radio collars. In Finland, lemming availability remained low. There were occastional observations of adult arctic foxes but no arctic fox litters (Fig. 1). However, there were 4 red fox litters (Table 4).

When lemming availability is increasing or high, most adult arctic foxes try to reproduce and are found established at dens in summer. In 2001, lemming availability was high in all of Sweden. The natural conditions in Jämtland, Västerbotten and southern Norrbotten in 2004 were not as good as in 2001, but still relatively comparable. In 2001, there were 6 arctic fox litters in these areas, while there were 14 in 2004 (Fig. 2). This indicate an increase in the arctic fox breeding population (see 'Overall Project Assessment' p. 18 for further discussion).

One of the reproductions in Swedish Borgafjäll 2004 failed in July. The lactating female was found dead approximately 70 meters from the den and the cubs, which had not been weaned, probably died inside the den. An autopsy of the female was performed at the Swedish National Veterinary Institute. According to the autopsy report, the female had 14 placental scars, indicating that she had given birth to a large litter earlier in summer. She died from biting injuries to the throat, most likely inflicted by a red fox.

Summer 2004 (Norway) Under the national arctic fox monitoring program, and SEFALO+, 266 of the known arctic fox dens were surveyed during summer 2004 (actions completed on assignment from the Norwegian Directorate for Nature Management). Priorities were given to den sites that have been used within the last 15 years. All arctic fox den sites in Børgefjell (Nordland), Hestkjølen (Nord Trondelag), Blåfjell (Nord Trøndelag) and Varangerhalvøya (Finnmark) were surveyed. We recorded 14 arctic fox litters and 5 red fox litters. The arctic fox litters was located in Troms-Dividalen (1), Nordland-Saltfjell (4), Nordland-Børgefjell (7) og Blåfjellområdet/Lierne in Nord Trøndelag (2) (Fig 1, Table 4). There were a minimum of 83 cubs recorded in total. Of these, 1 cub was captured and eartagged. We also captured 2 adults, but we did not have permits to tag adults so they were released without being tagged. A total of 67 new den sites were found during summer, 44 arctic fox dens, 22 red fox dens and 1 den of uncertain origin, and the national fox database now include 673 described

fox den sites (of which 531 are arctic fox den sites). There were no observations of foxes with eartags or radio collars during the summer.

Genetics and Subpopulation structure We have used DNA analysis to identify faeces from red and arctic foxes, a method which has been used continuously as a supplement during summer and winter surveys. In a collaboration between Stockholm University and NINA we have also developed a method to distinguish wild Fennoscandian arctic foxes from escaped farm-bred arctic foxes using DNA found in e.g. faeces. The work has proceeded according to plan and a Report on genetic identification of farmed arctic foxes will be produced during the next report period.

We have initiated a genetic study on the population substructure in Fennoscandia. The results from this study will be included in the report on the genetic structure in the Fennoscandian arctic foxes (A3, C1, D1), which will be produced by December 2006. Re-sightings of tagged foxes will also render data on migration and subpopulation structure. During this reporting period, 7 arctic foxes tagged as juveniles in 2000-2001 have bred in Sweden (4 males, 3 females) and two non-reproducing adults born in 2001 have been re-sighted (1 male, 1 female). All foxes were re-sighted within the same area (subpopulation) as they were born.

Variations/complications/delays Only a small number of foxes were captured and ear tagged in Norway this summer, although we made a large effort to tag foxes. The trapping attempts started in August but the cubs were relatively large and thus more shy of the traps than younger, more naïve cubs (a few weeks can make a large difference in behaviour). The arctic foxes were extremely disturbed by the trapping gear although we used the same methods and the same traps as in Sweden. The foxes in Sweden are probably more used to people and trapping gear since trapping has been done there for a longer time. In addition there were large amounts of lemmings and voles during this period of the summer which might have had implications on the trapping results. Next year, we will solve these problems by putting up unarmed trapping gear earlier so that foxes can get used to the traps. We will also start trapping earlier.

D2 Feeding Feeding of arctic foxes at inhabited dens is necessary since low food availability causes reproduction to fail (Threat 2). The action will increase the number of breeding attempts, litter sizes and juvenile survival. It might also improve adult survival. It is important to combine feeding with red fox control (D3) since feeding may otherwise attract red foxes with consequent negative effects on the arctic fox. The project leading group will produce an Evaluation Report on this action by June 2006.

Actions foreseen in report period We will feed arctic foxes at inhabited dens during summer and winter in Sweden and Finland. CABs, FFRI and PFS are responsible for the action. SU will analyse monitoring information so that allocation of resources can gain maximum effect (D1).

Progress to date During winter 2002-2003, before the start of SEFALO+, feeding was maintained in Helags, Borgafjäll and Vindelfjällen where a total of 11 dens were fed (Table 1). In summer 2003, feeding continued at the arctic fox breeding den in Helags and at a den in Borgafjäll where two adults remained in the area most of the summer (Table 2). In winter 2003-2004, a total of 23 dens were fed. The aim was to have feeding at all dens inhabited by arctic foxes if it was logistically possible. There was also feeding at some uninhabited dens since there was arctic fox activity in the area and consequently a fair chance that arctic foxes could establish there (Table 3). During summer 2004, we had feeding stations at 20 dens, including 11 of 14 dens with arctic fox litters and some dens where adult foxes used the feeding stations although they failed to reproduce (Table 4).

Variations/complications/delays Three dens with arctic fox litters were not fed during summer. The reasons were logistical (1 den), death of female and litter (Borgafjäll, 1 den, see D1) and that the litter was discovered too late in the season (1 den). In Finland, there was some feeding in winter but no feeding in summer as the arctic foxes never established at den sites (Table 3-4).

D3 Red fox control Red foxes will be controlled by culling in areas close to recent or previous arctic fox territories in Sweden and Finland. Culling is necessary as the red fox is a dominant competitor and a predator on arctic fox juveniles. Arctic foxes avoid areas with red foxes and do not establish there (Threat 3). Further, feeding (D2) involves a risk that red foxes are attracted to an area and take over arctic fox dens. All hunting will take the utmost caution, as not to cause any disturbance to other wildlife and only a limited number of carefully selected persons are included. The red fox is a common species in Fennoscandian forests and hunting in some selected mountain tundra habitats will not have any detrimental effects on the population as a whole. We expect culling to leave more dens and territories suitable for establishment of arctic foxes, which implies more litters born and higher juvenile survival due to decreased predation from red foxes. The project leading group will produce an Evaluation Report on this action by June 2006.
Actions foreseen in report period CABs, FFRI and PFS are responsible for performing culling. SU will analyse monitoring information so that allocation of resources gains maximum effect (D1). Rangers in the CAB's and selected experienced local hunters will perform culling.
Progress to date During winter 2002-2003, before the start of SEFALO+, red fox control was maintained in some areas. In Jämtland (Helags and Borgafjäll) a total of 19 red foxes were culled and in Finland a total of 113 red foxes were culled (Table 1).

In winter 2003-2004, a total of 197 red foxes were culled (Table 3). Red fox control has been carried out with different methods due to differences in logistics and local attitudes. In Finland, a handful of selected hunters have been given special permits to carry weapons on snowmobiles which increases efficiency. The hunters, who are local inhabitants, have to be accepted by all interest parties, e.g. Saami reindeer herders, to be selected. A small bounty is paid for each red fox. In Jämtland (Helags, Borgafjäll), the CAB has given selected rangers special permits to shoot red foxes from snow mobiles which is highly efficient. In Västerbotten (Borgafjäll), the CAB has also given their rangers special permits to shoot red foxes from snowmobiles. However, Västerbotten aims to use most resources for red fox hunting on an alternative method where they will encourage local hunters to shoot red foxes. Hunting is done according to ordinary hunting legislation, but the hunters receive a small bounty for red foxes shot in mountain tundra or birch forest. (There is no market for red fox pelts and few hunters are therefore generally interested in red fox hunting). If the method works, it may be an approach which is easier to maintain after SEFALO+. In Norrbotten, the CAB pays selected local hunters a small bounty per red fox shot in Sitas and Råstojaure. Hunting is done according to ordinary hunting legislation.
Variations/complications/delays In Jämtland, the rangers shot relatively few red foxes compared to previous winters. The reasons were unfavourable snow conditions and fewer occasions when it was possible for two people to hunt together, something which facilitates the work. Further, there was a general feeling that there were relatively few red foxes in the mountain tundra this year. Regarding the different methods used, hunting with the use of snow mobiles was shown to be efficient during the first phase of the project (SEFALO). It is to early to evaluate the effects of the methods tried in Västerbotten and Norrbotten, but there is an on-going discussion within the CABs on how to increase efficiency using this approach.
NOTE We have found a typing error in the approved contract regarding this action. We have planned to perform culling during all winters. For ethical reasons, culling should not be executed in summer when the foxes may have cubs. However, by mistake, we have listed that culling will be performed in summer 2007 (Form 22/2). We regret this mistake and enclose a correct form 22 (see Appendix p. 33)

D4 Disease The causative agent behind the disease causing encephalitis in captive arctic foxes will be identified and we will screen for presence of the pathogen and other diseases in the wild population in Sweden and Finland (Threat 4). Family groups will be observed and sick juveniles will

be clinically examined and sampled for blood chemistry, serology, infections and intestinal parasites. Arctic foxes found dead will be necropsied and tested for all known diseases. Based on the results, a strategy for eradication of the disease or a vaccination programme will be formed. A Disease Evaluation Report will be produced by December 2007.
Actions foreseen in report period SLU and NVI will work on the identification of the pathogen causing encephalitis. During monitoring (D1) we will check for symptoms in juveniles and collect arctic foxes found dead. A complete pathological description will also be made.
Progress to date The main scope and responsibility of SLU was to identify a causative agent of a fatal necrotizing encephalitis of arctic foxes within a captive programme and monitor its possible spread in nature. The latter includes wild arctic foxes and other animals. The agent has for many years been elusive. Several possible agents have before the start of SEFALO+ been tested with negative results by NVI. This is important in the sense that it is also important to rule out other infectious agents in order to prove the importance of a newly identified agent.

We have attacked the question on a broad basis using several techniques. A combined effort using molecular techniques has identified a new type of herpesvirus in the brain of several of the diseased animals. Furthermore we have shown that the virus coincides with the strong inflammatory reaction in the brain. Taken together this indicates strongly that this virus is a likely causative agent behind the fatal necrotizing encephalitis. However, this is not formal proof of this. Another explanation may be that another agent, still unidentified, reactivates a latent herpesvirus. For a stronger case we intend to expand the study in both sick and healthy individuals. Thus, we have identified a likely pathogen, a herpesvirus, in the brain and lungs of diseased animals. We have also ruled out some other possible candidates, such as *Encephalitozoon cuniculi*. We have made a thorough pathological examination of the disease and are in the progress to write a publication on the findings.

The arctic fox female that was found dead in Borgafjäll (see D1) had been dead for a few days at the most. The carcass was in a good condition and NVI has performed an autopsy on her (2004-10-25). The cause of death was biting injuries to the throat, most likely inflicted by a red fox. Additional tests of her general health and possible diseases showed an otherwise healthy animal with 14 placental scars, indicating that she had given birth to a large litter earlier in summer. SLU will also examine the female for signs of encephalitis and herpesvirus infection.

NVI has taken a few blood samples on juvenile foxes for later analyses.
Variations/complications/delays None

D5 Protection of areas around dens with cubs Areas around Swedish dens with arctic fox cubs will be excluded from ptarmigan hunting. Ptarmigans are hunted in basically all mountain tundra areas from August 25 until February or March. Excluding areas from hunting is necessary since hunters use unleashed dogs and especially juvenile foxes may be disturbed and leave the area (Threat 5). We expect a resulting increase in juvenile survival.
Actions foreseen in report period The CABs in Sweden will exclude areas around breeding dens from ptarmigan hunting.
Progress to date In 2003, the CAB of Jämtland excluded the area around the breeding den from ptarmigan hunting. In 2004, the CABs excluded the areas around 12 of the 14 breeding dens from ptarmigan hunting.
Variations/complications/delays Ptarmigan hunting was not forbidden around 2 of the breeding dens in Jämtland in 2004, as the litters were discovered too late in the season. In Norrbotten, the areas around breeding dens were only excluded from hunting with dogs, since the dogs, not hunting in it-self, constitutes the main threat to arctic foxes. The aim with this distinction was to achieve a greater local acceptance for the action.

E. Public awareness and dissemination of results

It is vital that the general public understands why arctic fox conservation is important. Increased awareness of the status and ecology of arctic foxes is necessary to gain local understanding and acceptance for actions such as red fox control (Threat 3, D3) and exclusion of areas from ptarmigan hunting (Threat 5, D5). Each action in this section has defined target groups.

E1 Website – Global information The SEFALO website at http://go.to/sefalo contains information about the SEFALO project, arctic fox ecology and conservation issues. The target groups are school children, students and scientists within and outside Europe.
Actions foreseen in report period SU is responsible for keeping the website updated.
Progress to date The website has been updated.
Variations/complications/delays None

E2 European information Information about the project will be presented on two pages in a catalogue for outdoor equipment. This catalogue is distributed twice a year in Swedish, English, German, Finnish, Norwegian and Danish. In 2004 it will also be published in Russian. The edition in 2003 was 100 000 copies, but it is planned to increase to 400 000. The target group is people engaged in outdoor activities.
Actions foreseen in report period SU will provide material to Fjällräven AB which will produce and distribute the catalogue in fall-winter 2003-2004 and spring-summer 2004.
Progress to date Information about the project was included in the fall-winter 2003-2004 edition of the catalogue.
Variations/complications/delays Due to a misunderstanding about the deadline for submission of material, no information about the project was included in the spring-summer 2004 edition of the catalogue. However, we have published an information text in February 2003 with this partner, which we suggest should compensate for this. We have straightened out the misunderstandings and the information should be distributed according to plan in the future.

E3 Local information addressed to wildlife tourists In the Nature Reserve of Vindelfjällen, Saami tourist operators certificated as eco-tourist companies, Lapplandsafari AB-Saami Ecolodge and Fjällhästen, will reach individual tourists that travel in arctic fox habitat with appropriate information.
Actions foreseen in report period SU is responsible for providing information to these local tourist operators. Lapplandsafari AB-Saami Ecolodge and Fjällhästen are responsible for disseminating information to their guests.
Progress to date Lapplandsafari AB-Saami Ecolodge and Fjällhästen have informed their guests about the project as planned. They have communicated arctic fox biology and SEFALO actions during informal contacts with their guests, i.e. about 15 tourist groups each. Complementary to SEFALO+, the CAB of Västerbotten has produced new exhibitions in Hemavan and Ammarnäs Naturum which includes information about arctic foxes. Lapplandsafari was involved in the planning of the exhibitions and the exhibitions will serve as a resource for Lapplandsafari and Fjällhästen in the future.
Variations/complications/delays None
NOTE We have found a typing error in the approved contract regarding this action. On form 31, informants in this action had been categorised as belonging to action E5. We regret this mistake and enclose a correct form 31 (see Appendix p. 35)

E4 Local information addressed to children Ramundberget is a holiday resort with skiing and hiking activities in a mountain area in Jämtland, Sweden. Ramundbergets Alpina AB will build a playground with an arctic fox theme (a fox den, fox statues, etc.) in 2003. Personnel will show children how the arctic foxes live and explain what problems they face. Booklets and toys with information on arctic fox conservation issues will be sold on a non-profit basis.
Actions foreseen in report period Ramundberget will build a playground and distribute information to their guests. SU will provide updated information to Ramundbergets Alpina AB.
Progress to date A playground which resembles an arctic fox den was built during autumn 2003. The playground is used during the winter season and during play, children learn how arctic foxes live in their dens. Information about arctic foxes have been disseminated by personell during public lectures and during informal contacts with tourists. During skiing contest for children, arctic fox puppets are distributed along with information about arctic foxes.
Variations/complications/delays The playground was built last year and was completed in December 2003, but documentation for SEFALO+ will be done during the up-coming winter. Thus, we will include photos of the activities in Ramundberget in the Interim Report in 2005. There has been a change in personnel at Ramundberget due to a sad car accident where the managing director died. Therefore, we have not been able to include a financial report from this partner in the current report. We will deal with this problem in early 2005 to make sure that all routines will work during the project period. The financial report from this partner will be included in the Interim Report in 2005.
NOTE We have found a typing error in the approved contract regarding this action. On form 31, informants in this action had been categorised as belonging to action E6. We regret this mistake and enclose a correct form 31 (see Appendix p. 35)

E5 Seminars - Conferences It is important to disseminate results and discuss planned actions within the international scientific community and with NGO's involved in conservation. Thus, we aim for a continuous process of project evaluation. We will arrange a total of 4 seminar with scientists, NGO's and other people with interest in arctic fox conservation. Prof. Pall Hersteinsson from Iceland University, who is officer in the IUCN Arctic Fox Specialist Group, will attend as external expert. SU will also attend four international scientific conferences to disseminate project results regarding conservation biology.
Actions foreseen in report period Planning of the first seminar.
Progress to date The first seminar was planned. It was arranged by Projekt Fjellreven, a Norwegian information project on arctic foxes, in collaboration with SEFALO+. The seminar was held in Meråker, Norway, on November 15-16, 2004. The Commission agreed to us holding the seminar outside EU.

Results from the project have also been presented the Sixth European Conference on Wildlife Disease Association (EWDA) in Uppsala 9-12th of September 2004.
Variations/complications/delays None
NOTE We have found a typing error in the approved contract regarding this action. On form 31, the external expert in this action had been categorised as belonging to action E7. We regret this mistake and enclose a correct form 31 (see Appendix p. 35)

E6 Press contacts We aim to keep continuous contacts with the press and disseminate project results to newspapers, magazines, radio and television.
Actions foreseen in report period All partners are responsible for keeping contacts with the press and disseminate results.
Progress to date The project has been featured in papers, television programmes, radio etc (see Appendix p. 29)
Variations/complications/delays None

E7 Layman's report SU will produce a layman's report at the end of the project period 2008. The report will be available in paper and electronic format, in Swedish and English.
Actions foreseen in report period None

F. Overall project operation

F1 Project leading The leading group will have frequent meetings and discuss co-ordination and how different actions (D1-D6) are implemented within the different countries (F3-F5). The Project leader is responsible for reports and communications with LIFE, for the overall project operation and basic financial administration. The Assistant Project leader is responsible for all actions in Finland while the Operating group leader for Norway is responsible for monitoring in Norway (D1). The Project leading group will present a General Management Plan and detailed plans for the action programme to the Steering Committee by December 2003. Based on the yearly Progress Reports, the Project leading group will present an updated Project Action Plan to the Steering Committee in November each year 2004-2007. The Project leading group will present a Final Report to the Commission by June 2008.
Actions foreseen in report period The project leading group will produce a General Management Plan by December 2003, have meetings, produce reports and communicate with LIFE.
Progress to date The General Management Plan was developed in autumn 2003, discussed with the steering committee in November and finalised by March 2004. The Plan will be updated continuously when needed. The leading group has also had ongoing discussions about progress, actions and arctic fox biology during the report period.
Variations/complications/delays None

F2 The Steering Committee The Steering Committee shall supervise the project, meet on a yearly basis and approve an updated project action plan, submitted by the Project leading group each year.
Actions foreseen in report period The Steering Committee will meet in November 2003 to confirm the planned actions and elaborate detailed evaluation routines for the project.
Progress to date The meeting was held on November 20, 2003 in Vantaa Helsinki, Finland. The situation for arctic foxes in each country was reviewed. Planned actions and research in Norway according to the Norwegian Action Plan (A2) was described. Field methods during actions and a draft of the General Management Plan were discussed. Prioritised areas for actions were determined. It was decided that the Steering Committee meeting should be held in different places each year and that the next meeting should be held in Norway in relation to an arctic fox seminar in November 2004.
Variations/complications/delays Two changes regarding representatives in the steering committee were announced. Arild Landa replaces John Linnell for NINA, and Mark Kissinger replaces Karina Lövgren for the CAB of Norrbotten.

F3 The Operating Group in Sweden The Operating group leader in Sweden is responsible for field actions and practical co-ordination.
Actions foreseen in report period The Operating group leader will have continuous contact with all Partners and coordinate the project. There will be meetings with field personnel to discuss the practical aspects of the actions.
Progress to date Project coordination had worked smoothly. A meeting with rangers from all CABs was held in Storuman, Västerbotten, on October 3, 2003. Field methods, protocols and reporting were discussed. Additional local meetings were held in Jämtland 17-18 December and in Norrbotten

on April 25, 2004. In addition to this Progress report, we have written a less formal report in Swedish which have been distributed to field workers and others in December 2004. A shorter letter was also written and distributed in 2003.
Variations/complications/delays The Operating group leader in Sweden, Magnus Tannerfeldt, was on parental leave in September. After parental leave, during the next report period, he will leave this project for another job. Bodil Elmhagen substitutes for Magnus Tannerfeldt during his parental leave and will thereafter fill his position as Operating group leader. Bodil Elmhagen has been involved in SEFALO since the start of the project in 1998 and substituted for Magnus Tannerfeldt for six months in 2002. Thus, the change should not cause any problems.

F4 The Operating Group in Finland The Operating group leader in Finland is responsible for field actions and practical co-ordination.
Actions foreseen in report period The Operative group leader will have continuous contact with people engaged in the project in Finland and co-ordinate the project. There will be meetings to discuss the practical aspects of the actions.
Progress to date Project co-ordination had worked smoothly. There have been two information meetings for red fox hunters and the general public (Enontekiö December 9, 2003, and Utsjoki December 10, 2003).
Variations/complications/delays None

F5 The Operating Group in Norway The Operating group leader in Norway is responsible for field actions and practical co-ordination.
Actions foreseen in report period The Operating group leader in Norway will have continuous contact with the group operating the national arctic fox monitoring program on behalf of the Norwegian Directorate for Nature Management (NDN): the Norwegian Nature Inspectorate (SNO) doing the practical work in the field, and the Norwegian Institute for Nature Research (NINA) which gives priorities, coordinates the reported results and runs the national fox database. The actions in SEFALO+ is actions in addition to the national arctic fox monitoring program which started in 2003 in Norway, and SEFALO+ actions will supplement national monitoring actions by extra monitoring effort in there boarder areas between Norway, Sweden and Finland, to cover areas that are not part of the national monitoring program. To ease actions as trapping and earmarking (D1), the Operating group leader in Norway will have running contact with the coordination field unit in SNO.
Progress to date Project co-ordination have worked smoothly and information between the different agencies involved in arctic fox monitoring is distributed effectively. There are priority meetings at the start of every summer season, and there is running contact between coordinators in the field during the whole summer. Changes and improvements are discussed at the end of every season.
Variations/complications/delays None

F6 Auditor's report The independent auditor at Stockholm University will make a revision in the last year of the project (2008) in accordance with Article 27 of the Standard Administrative Provisions.
Actions foreseen in report period None

Complementary actions in Norway

National monitoring program In summer 2003, Norwegian environmental authorities decided to start a national arctic fox monitoring program which covers more areas than SEFALO+. The Norwegian Directorate for Nature Management (DN) has given the assignment to the Norwegian

Nature Inspectorate (SNO) doing the practical work in the field and to the Norwegian Institute for Nature Research (NINA) which gives priorities, coordinates the reported results and runs the national fox database. The monitoring actions in SEFALO+ (D1) supplements the national monitoring actions by putting extra monitoring effort in the boarder areas between Norway, Sweden and Finland.

Genetic analyses Faeces samples are collected at den sites during the monitoring. Genetic analyses are performed to distinguish between faeces originating from arctic fox, red fox or wolverine. Mitochondrial haplotyping and microsatellite analyses are performed on the arctic fox samples both to get information on genetic substructures and to be able to detect foxes either with farm origin or potential hybrids between wild and farmed foxes. The microsatellite analyses are performed to get a more substantial basis for genetic sub structuring of the Fennoscandian arctic fox population. The genetic studies are done in cooperation with Stockholm University. As for Norway this action is not included in SEFALO+, but are additional actions that was started in 2004.

Captive breeding The Norwegian Institute of Nature Research (NINA), are running a captive breeding program for arctic foxes on assignment from the Norwegian Directorate for Nature Management (DN). The project received official approval in spring 2000. In summer 2001 a total of 6 pups were caught, followed by 3 more in 2002 and 4 in 2004. These represented 5 of the extant arctic populations (Hardangervidda, Blåfjell/Lierne, Børgefjell, Saltfjellet and Finnmark). All animals were housed in a conventional farm situation at Dal forsøksgård (Dal experimental animal station) belonging to the Norwegian Veterinary University until early 2004. In spring 2004 there was the first breeding success, 5 cubs were born after moving an arctic fox couple into a natural enclosure setting at Landedrag zoo. Plans for a set-up with 8 large enclosures in a natural habitat is currently under development in Oppdal Bygdeallmening and the 17 foxes that at currently in the captive breeding program will be moved there in spring 2005.

Red fox control In spring 2004, the Norwegian Directorate for Nature Management (DN) initiated the designing of a "red fox control research project" in Norway at the request from the Norwegian Ministry of Environment. The University of Tromsø, Prof. Rolf A. Ims and his research group, will implement a "red fox control program" from spring 2005 in their large scale ecosystem research project "Ecosystem Finnmarksvidda" in the northern county on Norway, Finnmark. Red fox control will be completed on the north-eastern half-island Varangerhalvøya, while three other areas are set up as control areas. Under this action it will be possible to test if the control of red fox leads to an increase in the arctic fox population. The group leading this research program is in close contact with SEFALO+ regarding the same control actions undertaken in SEFALO+, and evaluation of this control program will be coordinated between the different research groups.

Public information Norges Naturvernforbund (NNV), Norges Jeger og Fisker Forbund (NJFF), Verdens villmarks fond Norge (WWF) and Den norske turistforening (DNT), 4 non governmental organizations in Norway are together running "Prosjekt Fjellrev" a public information project (www.fjellrev.no). This information project was funded by the Norwegian Directorate for Nature Management (DN). Together with SEFALO+ and DN they arranged the Nordic arctic fox seminar in Meråker, Norway 15-16th November 2004. This seminar was partly financed by Nordisk Ministerråd. "Prosjekt fjellrev" also represent a joint political pressure highlighting the importance conserving the arctic fox on the Fennoscandian peninsula.

Overall Project Assessment

Overall, the project has run smoothly. In Sweden-Finland, we see an increase in the total population size of arctic foxes for the first time since the 1980's. However, the increase has been concentrated to a core area in Swedish Jämtland, Västerbotten and southern Norrbotten, while there is no change for the better in northern Norrbotten and Finland (Fig. 2-4). In Norway, the total number of recorded arctic fox litters has been relatively stable since the start of more intense den site monitoring in the beginning of the 1980's, varying from 0-16 litters between years, with peaks in numbers of litters following lemming population peaks (Fig. 5). However during this period the most isolated arctic fox populations as Dovrefjell/Snøhetta has gone extinct and there has been significant decrease in Central Hardangervidda and Indre Troms.

Estimated number of arctic foxes: The population size of arctic foxes is best estimated in summers of high lemming availability. Arctic foxes use large, conspicuous dens and it is therefore possible to perform surveys of known dens. However, in winter it is easy to overestimate population size since arctic foxes can move long distances. Tracks from one individual can therefore be counted more than once. But in summers of high lemming availability, most adults are established at dens and it is possible to get a reliable estimate of population size.

During the first phase of the project (1998-2002), we saw a continued overall decline in the adult reproducing population in Sweden (Fig. 3). In 2001, there was a lemming peak which covered all Swedish mountain tundra habitat. Despite this, only 9 litters were born in Sweden, and we estimated that there were 26-34 adults at dens. However, there were local differences in population trends in 1998-2002. Most notably, there seemed to be a positive trend in Helags from the winter 2000-2001 and onwards when we have had both extensive feeding and efficient red fox hunting in the area. Lemming availability was low in Sweden in 2002-2003. During this period, 5 arctic fox litters were born in Sweden, all of them at fed dens within the red fox control area in Helags. Further, adult mortality for Swedish arctic foxes prior to SEFALO was approximately 50%. There are no reliable estimates for juvenile mortality in arctic foxes, but it should be at least as high as adult mortality. We ear tagged 21 arctic fox cubs in Helags in 2001. Assuming an average adult and juvenile mortality of 50%, only 2.6 of these cubs should still be alive. Yet, in 2004 we re-sighted 6 of these foxes, 4 of which as reproducing adults. Thus, it is possible that actions in Helags have increased juvenile and/or adult survival.

In the summer of 2004, we estimated that there were a total of 41-48 adult arctic foxes at dens in Sweden-Finland and 14 litters were born, the highest numbers since the start of SEFALO in 1998. Lemming availability was relatively good in the southern parts of the Swedish mountain range and this made conditions overall favourable for arctic foxes. However, the lemming increase did not reach northern Norrbotten and Finnish Lapland and no arctic fox litters were found in these areas, where there were 3 litters in northern Norrbotten in 2001. This implies that the 14 litters found in the south were found in areas where there were only 6 litters in 2001 (Fig. 2). Thus, there has been a substantial increase in the arctic fox population of Jämtland, Västerbotten and southern Norrbotten. Actions within SEFALO and SEFALO+ have most likely contributed to this development, as Swedish areas with more extensive actions are located in the south.

Due to the relatively low lemming availability, population estimates for northern Norrbotten and Finland are less certain. However, there are no signs of an increase in the population. Generally, it is difficult to execute actions in northern Norrbotten. The reasons are mainly logistical. Areas with arctic foxes are situated longer distances from built-up areas and roads than in Västerbotten and Jämtland. We will continue discussions on how to increase the extent of actions in Norrbotten. In

Finland, red fox hunting is highly efficient. However, there are only a small number of arctic foxes (Fig. 1, 4a, Table 1-4) and they have not established at dens which makes feeding difficult. Arctic foxes mainly seem to pass through Finland. There are a number of possible explanations. Firstly, there have not been any lemming peaks in the area. Secondly, it may be difficult for the small number of arctic foxes in the area to find a partner. Thirdly, it could be that arctic foxes, despite efficient hunting of red foxes, often are disturbed by red foxes as the large number of culled red foxes could indicate that there are more red foxes around in Finland than in e.g. Helags (Table 1, 3, Fig. 4b). We aim to keep actions going in Finland, to increase the quality of the habitat and encourage arctic foxes to re-establish in the area.

In Norway, the minimum of 14 litters born this summer is the highest number since 2001, when a minimum15 arctic fox litters were born (Fig. 5). From the numbers of documented reproductions we estimate that there are no more than 50 adult arctic foxes in Norway. As in 2001, the relatively high reproduction in 2004 follows the lemming population peaks. It appears that the arctic foxes are still present throughout most of their former distribution, although gaps are starting to appear and the population is hence slowly decreasing. The Dovrefjell population appears to have gone extinct in the mid 1990's, leaving a gap of 300-400 km between the animals that occur around Finse, and those in the Swedish Sylane / Härjedalen population. Despite this wide distribution, the actual numbers of arctic foxes still present are very small. The Børgefjell population at the border of Nord-Trøndelag and Nordland counties stands out as the only population with more than 29 documented reproductions in the 10 year period 1994-2004.

Problems during the report period

We have not encountered any great problems during the report period. We had planned to start the project on June 1, 2003, and were supposed to have a final decision from EU LIFE-Nature by May or June. However, the decision was delayed until September. This implied that we could not get started to the extent we wanted during summer 2003. Therefore, we have only used about 20% of the budget during this report period (32% of the total time). All partners have found the forms for statements of accounts, worked hours, etc, difficult to understand and fill in even by professional economic secretaries. We hope this will work better next year as we have become more used to the forms.

Financial Summary

Budget Category	Spent (€)	Spent (% of budget)	Budget (€)
1. Personnel	311 687.50	22%	1 416 363.49
2. Travel	98 257.12	19%	509 251.84
3. External Assistance	5 662.40	12%	47 758.80
4. Durable goods	4 076.49	7%	59 398.37
5. Land purchase	0.00		0.00
6. Consumable material	31 769.62	15%	217 188.51
7. Other costs	5 782.00	6%	99 937.76
8. Overheads	33 144.89	21%	161 118.21
TOTAL	**490 380.02**	**20%**	**2 511 017.00**

Appendix: Tables and Figures

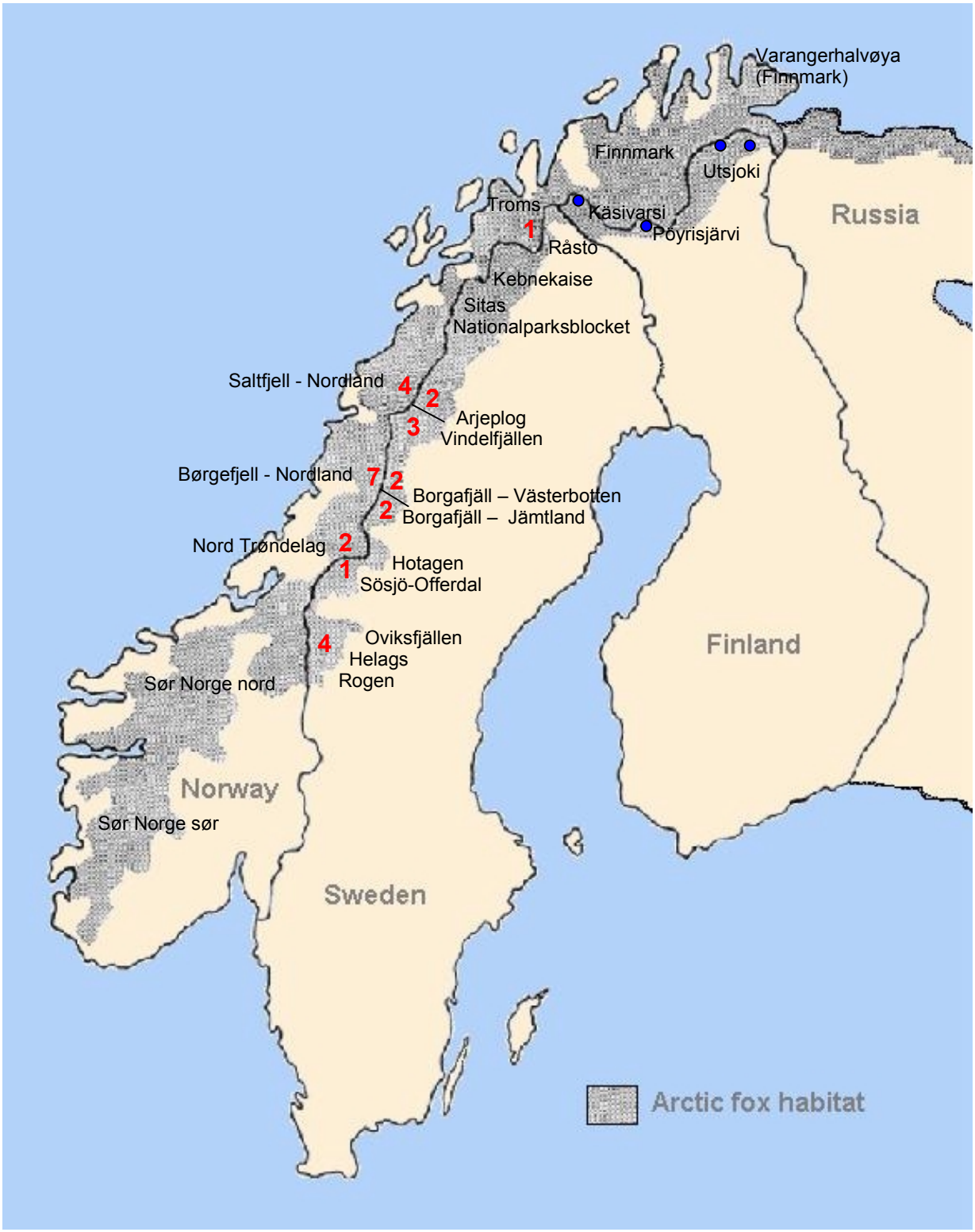

Figure 1. The project area includes arctic fox habitat in Finland, Sweden and Norway. Red numbers show the number of litters 2004 in different areas in Sweden and Norway. There were no arctic fox litters in Finland, but arctic foxes were observed in areas marked with blue dots.
Projektområdet inkluderar fjällrävshabitat i Finland, Sverige och Norge. Röda siffror visar antalet fjällrävskullar i olika svenska och norska fjällområden 2004. I Finland hittades inga fjällrävskullar, men synobservationer av vuxen fjällräv gjordes i områdena markerade med blå punkter.

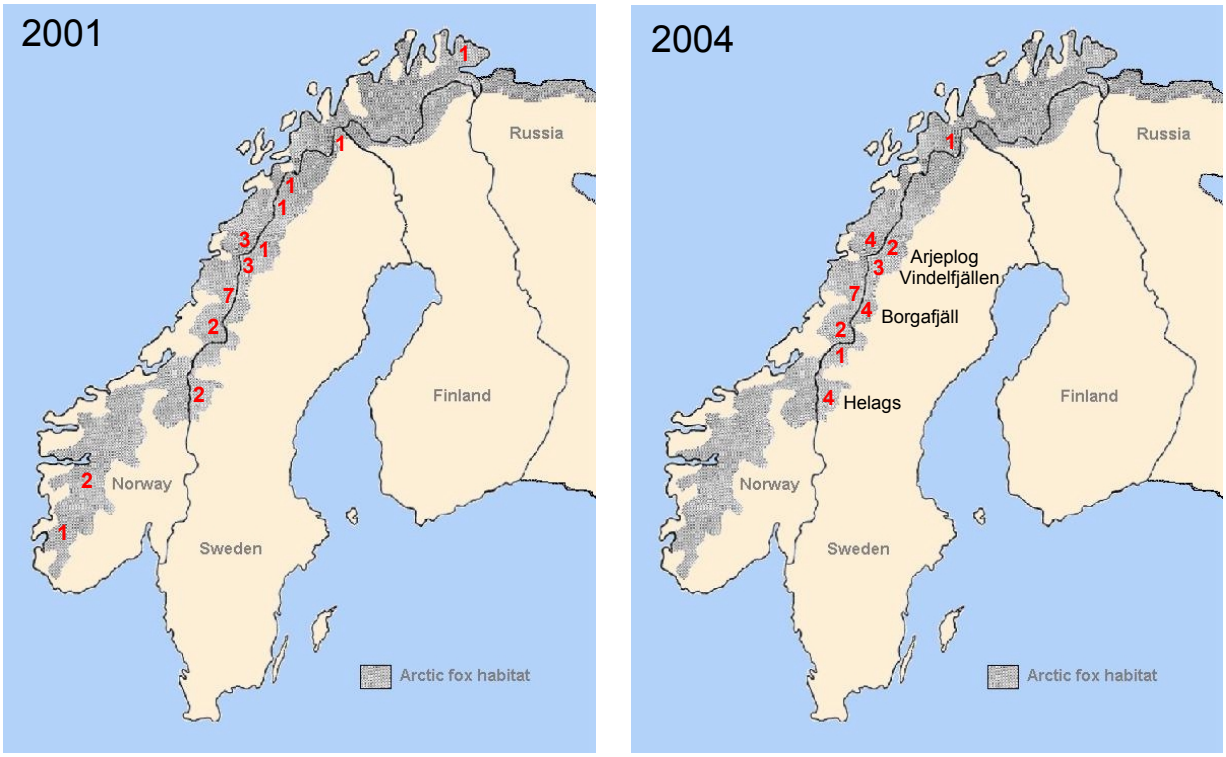

Figure 2. Arctic fox litters in Sweden and Norway in 2001 and 2004. Lemming availability was high in most of Sweden and Norway in 2001, but not in Finland. The number of adult arctic foxes is best estimated during such conditions as most adults try to breed and are found established at dens in summer. In 2004, lemming availability was intermediate to high in Vindelfjällen and Borgafjäll respectively, while there were less lemmings further south and north. Thus, overall conditions from Helags to Arjeplog were not as good as in 2001, but still relatively comparable. There were 6 litters in these areas in Sweden in 2001 while there were 14 in 2004, indicating an increase in the arctic fox breeding population.

Fjällrävskullar i Sverige och Norge 2001 resp. 2004. Tillgången på lämmel var mycket god i nästan hela Sverige och Norge 2001, medan Finland inte omfattades av lämmeltoppen. Antalet vuxna fjällrävar uppskattas bäst under sådana förhållanden eftersom de flesta försöker reproducera sig och därmed hittas etablerade vid lyor under sommaren. Sommaren 2004 var tillgången på lämmel intermediär till god i Vindelfjällen resp. Borgafjäll. Förhållandena från Helags i söder till Arjeplog i norr var därmed inte lika goda som 2001, men ändå relativt jämförbara. Sommaren 2001 hittades 6 kullar i dessa områden i Sverige, medan där fanns 14 sommaren 2004. Det tyder på en ökning av antalet vuxna fjällrävar.

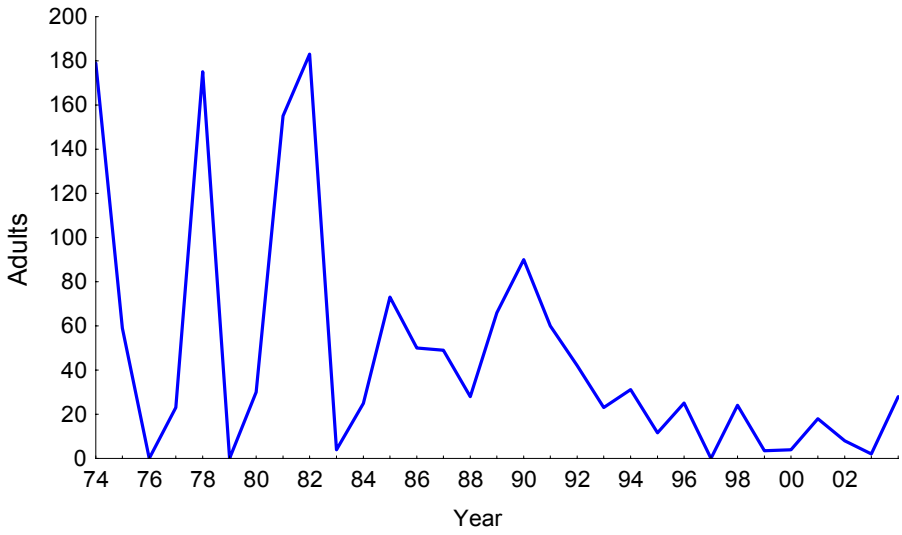

Figure 3. The number of arctic foxes that have reproduced in Sweden in 1974-2004. *Antal fjällrävar som reproducerat sig i Sverige 1974-2004.*

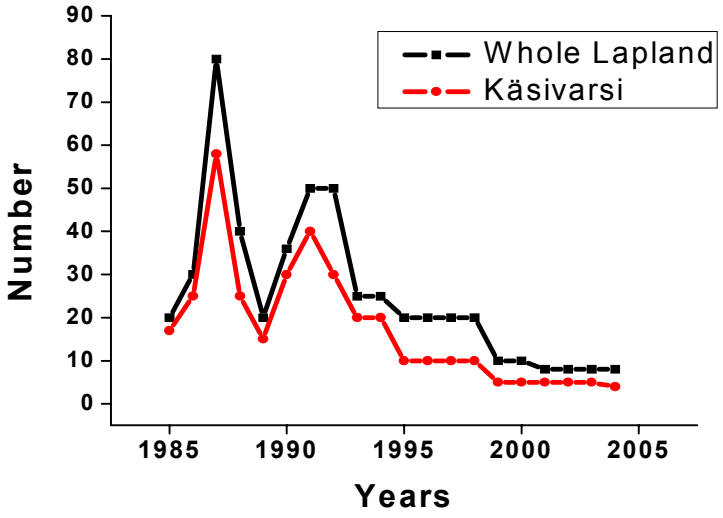

Figure 4a. Estimated numbers of arctic foxes in Käsivarsi and the whole of Finnish Lapland 1985-2004. *Uppskattat antal fjällrävar i Käsivarsi resp. hela finska Lapland 1985-2004.*

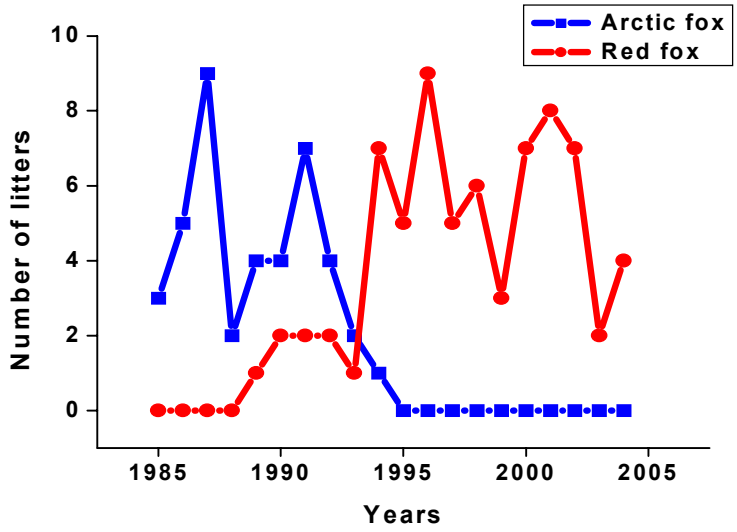

Figure 4b. The number of arctic and red fox litters in Käsivarsi, Finland 1985-2004. *Antal fjäll- och röd-rävskullar i Käsivarsi, Finland 1985-2004.*

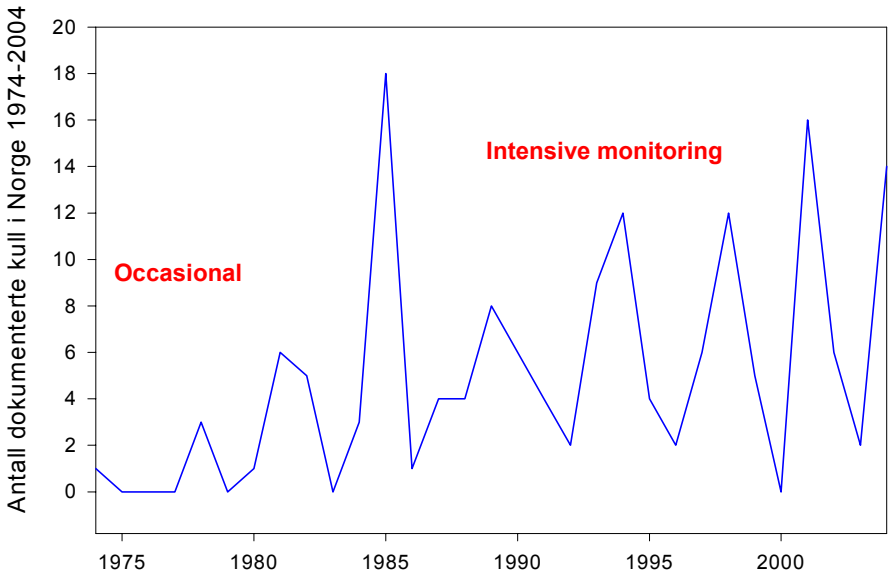

Figure 5. The number of arctic fox litters in Norway in 1974-2004. *Antal fjäll-rävskullar i Norge 1974-2004.*

Table 1. Results of monitoring in winter 2002-2003 complementary to SEFALO+ in Sweden and Finland (- = no information). *Resultat av inventeringar vintern 2002-2003, utanför SEFALO+ i Sverige och Finland (- = ingen information).*

Country	Area	Known dens	Monitored dens	Dens with arctic foxes	Estimated no of arctic foxes[1]	Fed dens	Dens with red foxes	Culled red foxes	Organisation responsible for field work
SE - Z	Rogen	1	0	-	-	0	-	0	CAB Jämtland
SE - Z	Helags-Lunndörrsfjällen	53	53	2	5-8	5	1	15	CAB Jämtland
SE - Z	Oviksfjällen	4	4	0	0	0	0	0	CAB Jämtland
SE - Z	Sösjö-Offerdalsfjällen	1	1	0	0	0	0	0	CAB Jämtland
SE - Z	Hotagen	5	0	-	-	0	-	0	CAB Jämtland
SE - Z	Borgafjäll - Jämtland	13	13	1	5-6	3	0	4	CAB Jämtland
SE -AC	Borgafjäll - Västerbotten	34	33	6	6-8	2	0	0	CAB Västerbotten
SE -AC	Vindelfjällen, S Storfjället	115	65	1	1	1	1	0	CAB Västerbotten
SE - BD	Arjeplog	35	10	7	7-14	0	0	0	CAB Norrbotten
SE - BD	Nationalparksblocket	43	4	0	0	0	0	0	CAB Norrbotten
SE - BD	Sitas	29	23	0	0	0	0	0	CAB Norrbotten
SE - BD	Kebnekaise	6	2	0	0	0	1	0	CAB Norrbotten
SE - BD	Råsto	55	33	0	0	0	1	0	CAB Norrbotten
FIN	Käsivarsi	65	0	-	-	0	-	21	FFRI
FIN	Pöyrisjärvi	16	14	0	0-1	0	6	22	Metsähallitus
FIN	Utsjoki	106	77	0	5-7	0	28	70	Metsähallitus
	TOTAL	**581**	**332**	**17**	**29-45**	**11**	**38**	**132**	

[1]Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

[s]Red foxes shot from snow mobiles by rangers (Sweden) or selected local people (Finland) with special permissions. *Rödrävar skjutna från skoter av naturbevakare (Sverige) eller av utvalda personer ur lokalbefolkningen (Finland) med specialtillstånd.*

[L]Red foxes shot by local people according to ordinary hunting legislation rules. *Rödrävar skjutna av lokalbefolkning enligt ordinarie jaktlagstiftning.*

Table 2. Results of monitoring in summer 2003 complementary to SEFALO+ in Sweden and Finland (- = no information). *Resultat av inventeringar sommaren 2003, utanför SEFALO+in Sweden and Finland (- = ingen information).*

Country	Area	Known dens	Monitored dens	Dens with arctic fox litter	Adult arctic foxes at dens[1]	Fed dens	Red fox litters	Organisation responsible for field work
SE - Z	Rogen	1	1	0	0	0	0	CAB Jämtland
SE - Z	Helags	57	57	1	2	1	1	CAB Jämtland
SE - Z	Oviksfjällen	5	5	0	0	0	1	CAB Jämtland
SE - Z	Sösjö-Offerdalsfjällen	1	0	0	0	0	0	CAB Jämtland
SE - Z	Hotagen	5	0	0	0	0	0	CAB Jämtland
SE - Z	Borgafjäll - Jämtland	13	13	0	2	1	0	CAB Jämtland
SE -AC	Borgafjäll - Västerbotten	34	17	0	3-6	0	0	CAB Västerbotten, SU
SE -AC	Vindelfjällen, S Storfjället	115	92	0	2-4	0	0	CAB Västerbotten, SU
SE - BD	Arjeplog	35	3	0	0	0	0	CAB Norrbotten
SE - BD	Nationalparksblocket	43	29	0	1	0	1	CAB Norrbotten, SU
SE - BD	Sitas	29	0	-	-	0	-	CAB Norrbotten
SE - BD	Kebnekaise	6	0	-	-	0	-	CAB Norrbotten
SE - BD	Råsto	55	43	0	0	0	0	CAB Norrbotten
FIN	Käsivarsi	65	61	0	5[2]	0	2	FFRI
FIN	Pöyrisjärvi	16	12	0	0-1[2]	0	0	Metsähallitus
FIN	Utsjoki	106	77	0	5-7[2]	0	2	Metsähallitus
	TOTAL	**586**	**410**	**1**	**20-28**	**1**	**7**	

[1]Estimation of the rangers in each area . *Fältpersonalens uppskattning i respektive områden.*

[2]Estimated number of arctic foxes in the area (i.e. non-territorial foxes that have not established at dens). *Uppskattat antal fjällrävar i området (d v s icke-territoriella rävar som inte etablerat sig vid lya).*

Tabel 3. Results of monitoring in winter 2003-2004 in Sweden and Finland (- = no information). *Resultat av inventeringar vintern 2003-2004 i Sverige och Finland (- = ingen information)*

Country	Area	Known dens	Monitored dens	Dens with arctic foxes	Estimated no of arctic foxes[1]	Fed dens	Dens with red foxes	Culled red foxes	Organisation responsible for field work
SE	Rogen	2	2	0	0	0	0	0	CAB Jämtland
SE	Helags-Lunndörrsfjällen	58	55	5	12-15	8	2	8[S]	CAB Jämtland
SE	Oviksfjällen	5	5	0	0	0	1	0	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	1	0	0	0	0	0	0	CAB Jämtland
SE	Hotagen	5	0	0	0	0	0	0	CAB Jämtland
SE	Borgafjäll - Jämtland	13	10	3	5	5	2	2[S]	CAB Jämtland
SE	Borgafjäll - Västerbotten	34	34	8	8-11	7	0	16[L]	CAB Västerbotten
SE	Vindelfjällen, S Storfjället	115	87	6	8-9	0	1	0	CAB Västerbotten
SE	Arjeplog	35	3	1	5-8	0	1	0	CAB Norrbotten
SE	Nationalparksblocket	43	28	2	2	0	0	0	CAB Norrbotten
SE	Sitas	29	18	0	1-2	0	0	4[L]	CAB Norrbotten
SE	Kebnekaise	6	1	0	0	0	0	0	CAB Norrbotten
SE	Råsto	55	30	4	2-5	1	1	6[L]	CAB Norrbotten
FIN	Käsivarsi	65	34	0	5	0	1	14[S]	FFRI
FIN	Pöyrisjärvi	16	15	0	1-2	0	7	42[S]	Metsähallitus
FIN	Utsjoki	106	89	0	4-8	2	30	105[S]	Metsähallitus
NO	*No monitoring in winter*	-	-	-	-	-	-	-	
	TOTAL	**588**	**411**	**29**	**48-67**	**23**	**46**	**197**	

[1]Estimation of the rangers in each area. *Fältpersonalens uppskattning i respektive områden.*

[S]Red foxes shot from snow mobiles by rangers (Sweden) or selected local people (Finland) with special permissions. *Rödrävar skjutna från skoter av naturbevakare (Sverige) eller av utvalda personer ur lokalbefolkningen (Finland) med specialtillstånd.*

[L]Red foxes shot by local people according to ordinary hunting legislation rules. *Rödrävar skjutna av lokalbefolkning enligt ordinarie jaktlagstiftning.*

Table 4. Results of monitoring in summer 2004 (- = no information). *Resultat av inventeringar sommaren 2004 (- = ingen information)*

Country	Area	Known dens	Monitored dens	Dens with arctic fox litter	Adult arctic foxes at dens[1]	Fed dens	Red fox litters	Organisation responsible for field work
SE	Rogen	3	3	0	0	0	0	CAB Jämtland
SE	Helags	58	53	4	8	4	1	CAB Jämtland
SE	Oviksfjällen	5	5	0	0	0	1	CAB Jämtland
SE	Sösjö-Offerdalsfjällen	3	3	1	2	0	0	CAB Jämtland
SE	Hotagen	5	0	0	0	0	0	CAB Jämtland
SE	Borgafjäll - Jämtland	13	10	2	4	5	1	CAB Jämtland
SE	Borgafjäll - Västerbotten	34	34	2	7	3	1	CAB Västerbotten, SU
SE	Vindelfjällen, S Storfjället	115	92	3	6	2	3	CAB Västerbotten, SU
SE	Arjeplog	35	23	2	4-8	5	2	CAB Norrbotten
SE	Nationalparksblocket	43	27	0	1-2	0	4	CAB Norrbotten, SU
SE	Sitas	29	16	0	0	0	0	CAB Norrbotten, SU
SE	Kebnekaise	6	0	-	-	-	-	CAB Norrbotten
SE	Råsto	55	20	0	3-6	1	2	CAB Norrbotten
FIN	Käsivarsi	67	55	0	5[2]	0	4	FFRI
FIN	Pöyrisjärvi	16	14	0	0	0	0	Metsähallitus
FIN	Utsjoki	113	110	0	0	0	0	Metsähallitus
	TOTAL Swe-Fin	**600**	**465**	**14**	**40-48**	**20**	**19**	
NO[3]	Finnmark	105	61	0	0	-	2	SNO –Fjelltjenesten
NO[3]	Troms	39	13	1	1-2	-	0	SNO – Fjelltjenesten
NO[3]	Børgefjell – Nordland	32	27	7	11-17	-	0	SNO – Fjelltjenesten
NO[3]	Saltfjell - Nordland	46	38	4	5-8	-	0	SNO – Fjelltjenesten
NO[3]	Rest of Nordland	6	6	0	0	-	0	SNO – Fjelltjenesten
NO[3]	Nord Trøndelag	15	12	2	2-4	-	0	SNO
NO[3]	Sør Norge nord	125	58	0	0	-	1	SNO
NO[3]	Sør Norge sør	163	51	0	0	-	0	SNO-NINA
	TOTAL Norway	**531**	**266**	**14**	**19-31**	**0**	**3**	

[1]Estimation of the rangers in each area . *Fältpersonalens uppskattning i respektive områden.*

[2]Estimated number of arctic foxes in the area (i.e. non-territorial foxes that have not established at dens). *Uppskattat antal fjällrävar i området (d v s icke-territoriella rävar som inte etalberat sig vid lya).*

[3]These numbers are collected under the Norwegian national arctic fox monitoring program and SEFALO+. *Uppgifter insamlade inom Norges nationella övervaknings-program för fjällräv och SEFALO+*

Table 5. Lemming and vole availability in different areas in summer 2003 (no. caught/100 trapnights during snap trapping). Lemming is the main prey of arctic foxes in most areas, while different vole species are an alternative prey. *Lämmel- och sorktillgång i olika områden sommaren 2003 (antal fångade/100 fällnätter vid fällfångst). Lämmel är fjällrävens viktigaste bytesdjur i de flesta områdena, medan sork är ett alternativt bytesdjur.*

Country	Area	Trapping method	Lemming *Lemmus lemmus*	Vole *Microtus & Clethrionomys*	TOTAL
SE	Helags	Systematic	0.14	0.56	0.70
SE	Vindelfjällen	Systematic	0.14	0.69	0.83
SE	Nationalparksblocket	Systematic	0	0	0
SE	Sitas	Systematic	0	0	0

Table 6. Lemming and vole availability in different areas in summer 2004 (no. caught/100 trapnights during snap trapping). Lemming is the main prey of arctic foxes in most areas, while different vole species are an alternative prey. *Lämmel- och sorktillgång i olika områden sommaren 2004 (antal fångade/100 fällnätter vid fällfångst). Lämmel är fjällrävens viktigaste bytesdjur i de flesta områdena, medan sork är ett alternativt bytesdjur.*

Country	Area	Trapping method	Lemming *Lemmus lemmus*	Vole *Microtus & Clethrionomys*	TOTAL
SE	Helags	Systematic	0	1.67	1.67
SE	Borgafjäll	Systematic	4.03	3.19	7.22
SE	Vindelfjällen	Systematic	0.50	0.92	1.42
SE	Arjeplog	Systematic	0	0.42	0.42
SE	Nationalparksblocket	Systematic	0.10	3.02	3.12
SE	Sitas	Systematic	0	3.54	3.54
SE	Pältsa -Råstojaure	Selective			*6.00*[1]
FIN	Käsivarsi	Selective			*2.00*[1]

[1]Selective trapping method renders more captures than systematic trapping. *Selektiv fångstmetod ger generellt fler fångster än systematisk fångst.*

Appendix: Media and Publications

(01-06-2003 – 30-09-2004)

Radio and Television

1. 16-06-2003 NRK Radio. Brende vurdere rødrev-jakt [Feature: *Brende is looking at red fox hunting*]
2. 14-07-2003 NRK Radio. Sårbar sjarmør i pels [Feature: *Vulnerable charmer in fur.* Interview Matti Mela, Lars Liljemark]
3. 06-08-2003 Sveriges Television Kanal 2. Aktuellt. Feature: SEFALO+ starts
4. 06-08-2003 Sveriges Radio Ekot. Rejäl satsning för att rädda fjällräven. [*Large effort to save the arctic fox.* Interview Anders Angerbjörn]
5. 06-08-2003 Sveriges Radio Västerbotten. Nytt projekt för att rädda fjällräven. [New project to save the arctic fox. Interview Anders Angerbjörn]
6. 21-08-2003 NRK Radio. Ingen fjellrev-yngling [Feature: *No arctic fox breeding*]
7. 06-09-2003 NRK Radio. Fem millioner til fjellreven [Feature: *5 million to the arctic fox*]
8. 21-10-2003 NRK Radio. Fjellreven har mange fiender. [Feature: *The arctic fox has many challenges.* Interview Nina Eide]
9. 25-01-2004 Radio 1, Finland. Lecture by Asko Kaikusalo
10. 02-04-2004 NRK Radio. Fjellreven skal reddes på Varangerhalvøya [Feature: *The arctic fox will be saved at Varangerhalvøya*]
11. 15-05-2004 Efter Tre, Sveriges Radio P4. Interview Anders Angerbjörn
12. 01-06-2004 Lappland Radio, Finland. Interview Asko Kaikusalo
13. 26-07-2004 Dagens eko, Sveriges Radio P1. Feature after interview with M. Tannerfeldt
14. 29-07-2004 NRK Radio. Sensasjon i fjellet [Feature: *Sensation on the mountain tundra*]
15. 12-08-2004 MTV 3, Utsjoki. Feature: On old arctic fox dens
16. 13-08-2004 NRK Radio. Fjellrev i framgang [Feature: *The arctic fox population increases this year*]
17. 14-08-2004 NRK Radio. Skal skyte rødrev for å berge fjellrev [Feature: *Will shoot red foxes to save the arctic fox*]
18. 30-08-2004 Same TV, Inari. Feature: Conclusions on the arctic fox in Finland this year
19. 04-09-2004 Naturmorgon, Sveriges Radio P1. Interview Anders Angerbjörn
20. 10-09-2004 NRK Radio. Ta hensyn til fjellreven. [Feature: *Be aware of the arctic fox, take care*]
21. 13-09-2004 Sveriges Radio Norrbotten. Två nya fjällrävskullar i länet. [*Two new arctic fox litters in the county.* Feature after interview with Mark Kissinger and Love Dalén]
22. 15-09-2004 Mitt i Naturen, Sveriges Television Kanal 1. Feature on SEFALO+ results this year
23. 15-09-2004 Sveriges Radio Jämtland. Sex nya kullar fjällrävar i länet [*Six new arctic fox litters in the county.* Interview Ruben Johansson]

Newspapers

1. 10-12-2003 Lapin Kansa. Naalitutkimukselle jatkoaikaa [*Arctic fox research continues*]
2. 22-01-2004 Nationen. Kun to Ynglinger i fjor [*Only to sucessful breedings last year*]
3. 19-03-2004 Arbeidets Rett. Kan Brende redde fjellreven? [*Can Brende save the arctic fox?*]
4. 24-07-2004 Trønder Avisa. Fjellrevyngling i Lierne [*Arctic fox breeds in Lierene*]
5. 16-08-2004 Kristianstadsbladet. Fjällräven på väg tillbaka. [*The arctic fox on its way back*]

6. 02-09-2004 Norrländska Socialdemokraten. En rödingnatt i fjällrävens rike. [*A night of char fishing in the realm of the arctic fox*]
7. 02-09-2004 Norrländska Socialdemokraten. Kissingers valp är guld värd. [*Kissinger's cub is worth its weight in gold*]
8. 30-08-2004 Svensk Jakt 9. Hopp för fjällrävarna. [*Hope for arctic foxes*]
9. xx-09-2004 Våra Rovdjur nr. 3. Sommaren 2004 – en ljusning för fjällräven? [*The summer of 2004 – an improvement for the arctic fox?*]
10. 13-09-2004 Sörmlands Nyheter. Efterlängtade valpar ger hopp för fjällräven. [*Longed-for cubs renders hope for the arctic fox*]
11. 14-09-2004 forskning.no. Vis hensyn til fjellreven. [*Be aware of the arctic fox, take care*]
12. 14-09-2004 Svenska Dagbladet. Lämlarna räddar fjällrävarna. [*Lemmings save arctic foxes*]
13. 14-09-2004 Norrbottenskuriren. Luddig fjällkrabat på väg tillbaka. [*Fluffy fellow on its way back*]
14. 14-09-2004 Piteå-Tidningen. Efterlängtade valpar ger hopp för fjällräven i Norrbotten [*Longed-for cubs renders hope for the arctic fox in Norrbotten*]
15. 14-09-2004 Norrländska Socialdemokraten. Efterlängtade valpar ger hopp för fjällräven. [*Longed-for cubs renders hope for the arctic fox*]
16. 14-09-2004 Norra Västerbotten. Fjällräven på återtåg. [*The arctic fox returns*]
17. 24-09-2004 Rana Blad. Liten rev kan velte stort gruveprosjekt. [*Small fox may overthrow large mining project*]

Publications from the Beneficiary, Partners and Co-financiers

1. Tannerfeldt M. 2003. Endast fyra fjällrävsvalpar föddes 2003. [*Only four cubs born in 2003]* Fauna & Flora 98(4): 42.
2. Swedish Environmental Protection Agency. 2003. Mer naturvård med LIFE. [*More nature conservation with LIFE*]. Brochure.
3. WWF 2003. EU stöder fjällrävar. [*EU supports arctic foxes*] WWF Eko 5-2003: 46.
4. Länsstyrelsen i Jämtlands län. 2003. Intet ont anande. [*Unsuspecting*] Miljömål i Jämtlands län: 24-25.
5. Angerbjörn A, Elmhagen B. 2003. Hotar fjällräven: Svält, rödräv, inavel. [*Threatens the arctic fox: starvation, red foxes, inbreeding*] Miljöforskning 5-6: 41-43.
6. Dalén L, Götherström A, Angerbjörn A. 2004. Identifying species from pieces of faeces. Conservation Genetics 5:109-111.
7. Dalén L, Elmhagen B, Angerbjörn A. 2004. DNA analysis on fox faeces and competition induced niche shifts. Molecular Ecology 13: 2389–2392.
8. Angerbjörn A, Hersteinsson P, Tannerfeldt M. 2004. Consequences of resource predictability in the arctic fox – two life history strategies. Pp 163-172 i*n:* DW Macdonald & C Sillero-Zubiri (eds.). The Biology & Conservation of Wild Canids. Oxford University Press.
9. Elmhagen B. 2004. Vårt mest hotade rovdjur – och släkten misstänks vara värst för fjällräven. [*Our most endangered predator – and red foxes is one of the worst threats against the arctic fox*] Våra Rovdjur 1: 4-6.
10. Mela, M. 2004. Uusi 5-vuotinen Naali Life käynnistynyt. [*The new 5-year project Arctic Fox Life starts*] Inarilainen. 04-02-2004.
11. Dalén L, Fuglei E, Hersteinsson P, Kapel CMO, Roth JD, Samelius G, Tannerfeldt M, Angerbjörn A. 2004. Population history and genetic structure of a circumpolar species: the arctic fox. Biol. J. Linn. Soc. In press.
12. Angerbjörn A, Elmhagen B. 2004. The arctic fox under extreme pressure. Swedish Research for

Sustainability 1: 14-15.
13. Angerbjörn A, Hersteinsson P, Tannerfeldt M 2004. Arctic fox *(Alopex lagopus).* Pp 117-123 in: DW Macdonald & C Sillero-Zubiri (eds.). Canids: Foxes, Wolves, Jackals and Dogs – Status survey and conservation action plan. IUCN, Gland.
14. Kaikusalo, A. 2004. Naali [Arctic fox]. – Teoksessa: Järvinen, A, and Lahti, S., (toim.), Suurtuntureiden luonto, ss. 118-199. Palmenia-kustannus, Helsinki. [In: Järvinen, A. and Lahti, S., (eds), The nature of great fjells, pp. 118-119, Palmenia-publisher, Helsinki]
15. Henttonen, H. 2004. Jyrsijätutkimukset ja sopulivaellukset. [*Rodent research and lemming migrations*]. – Teoksessa: Järvinen, A. ja Lahti, S. (toim.), Suuruntureiden luonto, ss. 133-147. [In: Järvinen, A, and Lahti, S. (eds), The nature of great fjells, pp. 133-147., Palmenia-publisher, Helsinki]
16. Norén K. 2004. Genetic structure in farmed arctic foxes. Examensarbete Zoologiska institutionen, Stockholms Universitet 2004: 15.
17. Nyström V. 2004. Ancient DNA analysis on genetic change over time in the bottlenecked Fennoscandian arctic fox. Zoologiska institutionen, Stockholms Universitet Examensarbete 2004: 17.
18. Bergman, C. 2004. Hotad slummer för fjällets Mickel. [*Threatened slumber for the arctic fox*] Friluftsliv 1: 58-61.
19. WWF 2004. Sommaren 2004: Ett oväntat bra år för fjällräven [*An unexpectedly good year for the arctic fox*] WWF Eko 4-2004: 22-23.

Web pages

http://go.to/sefalo

English - http://www.zoologi.su.se/research/alopex
Svenska - http://www.zoologi.su.se/research/alopex/hem.htm

Appendix: Meetings and other activities

(01-06-2003 – 30-09-2004)

AA-Anders Angerbjörn, AK-Asko Kaikusalo, BE-Bodil Elmhagen, HH-Heikki Henttonen, MM-Matti Mela, MT-Magnus Tannerfeldt, LD - Love Dalén

03-10-2003	Meeting Operating Group Sweden. *Storuman, Sweden.* (BE, LD, rangers Z, AC, BD län)
20-11-2003	Steering Committee Meeting at FFRI/Metla. *Vantaa Helsingfors, Finland.*
09-12-2003	Information meeting for red fox hunters and the public. *Enontekiö, Finland.* (MM)
10-12-2003	Information meeting for red fox hunters and the public.*Utsjoki, Finland.* (MM)
17/18-12-2003	Meeting for rangers in Jämtland. CAB of Jämtland. *Östersund, Sweden* (MT, rangers in Jämtland)
25-03-2004	Public lecture on the arctic fox, Kilpisjärvi (AK)
25-04-2004	Arctic fox meeting. CAB of Norrbotten. *Jokkmokk, Sweden.* (rangers BD län)
13-06-2004	Public lecture on the arctic fox, Kilpisjärvi (AK)
07-02-2004	”The arctic fox – the most threatened mammal in Sweden” Public presentation about the arctic fox and SEFALO+ during the 399th yearly winter market in Jokkmokk at Ájtte, Swedish fjell- and sami museum. *Jokkmokk, Norrbotten, Sweden.* (BE)
09-09-2004-12-09-2004	Presentations of the project at the Sixth European Conference on Wildlife Disease Association (EWDA) in Uppsala 9-12th of September 2004 (www.sva.se/ewda/). Two oral abstracts were presented: - Pathology of necrotizing encephalitis in Swedish arctic foxes (*Alopex lagopus*) by Erik Ågren, Dolores Gavier-Widén, Kristina Nilsson, Torsten Mörner and Anna-Lena Berg. - Detection of herpesvirus by PCR in Arctic foxes (*Alopex lagopus*) with encephalitis in Sweden by Frederik Widén and Mikael Berg

Appendix

Corrected form 22. A printing error in the approved contract have been corrected (Action D3: no red fox hunting is to take place in summer 2007)

LIFE-Nature 2003-22/1

TIME PLANNING

List all actions ordered by number and using their numbers or names. Tick as appropriate

Action	**2003**				**2004**				**2005**				**2006**			
Number/name	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**
A. Preparatory actions, elaboration of management plans and/or action plans :																
A1			x					x								
A2						x										
A3																x
B. Purchase/lease of land and/or rights :																
C. Non-recurring biotope management :																
C1												x				
D. Recurring biotope management :																
D1					x	x	x	x	x	x	x	x	x	x	x	x
D2					x	x	x	x	x	x	x	x	x	x	x	x
D3					x			x	x			x	x			x
D4			x	x	x	x	x	x	x	x	x	x	x	x	x	x
D5			x				x				x				x	
E. Public awareness and dissemination of results :																
E1			x	x	x	x	x	x	x	x	x	x	x	x	x	x
E2				x		x		x		x		x		x		x
E3			x	x	x	x	x	x	x	x	x	x	x	x	x	x
E4				x	x			x	x			x	x			x
E5								x				x				x
E6			x	x	x	x	x	x	x	x	x	x	x	x	x	x
E7																
F. Overall project operation and monitoring:																
F1			x	x	x	x	x	x	x	x	x	x	x	x	x	x
F2				x				x				x				x
F3			x	x	x	x	x	x	x	x	x	x	x	x	x	x
F4			x	x	x	x	x	x	x	x	x	x	x	x	x	x
F5			x	x	x	x	x	x	x	x	x	x	x	x	x	x
F6																

TIME PLANNING

List all actions ordered by number and using their numbers or names. Tick as appropriate

Action	**2007**				**2008**											
Number/name	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**								
A. Preparatory actions, elaboration of management plans and/or action plans :																
A1																
A2																
A3																
B. Purchase/lease of land and/or rights :																
C. Non-recurring biotope management :																
C1																
D. Recurring biotope management :																
D1	x	x	x	x												
D2	x	x	x	x												
D3	x			x												
D4	x	x	x	x												
D5			x													
E. Public awareness and dissemination of results :																
E1	x	x	x	x	x	x										
E2		x		x		x										
E3	x	x	x	x	x	x										
E4	x			x	x											
E5				x												
E6	x	x	x	x	x	x										
E7						x										
F. Overall project operation and monitoring:																
F1	x	x	x	x	x	x										
F2				x		x										
F3	x	x	x	x	x	x										
F4	x	x	x	x	x	x										
F5	x	x	x	x	x	x										
F6						x										

Appendix

Corrected form 31. A printing error in the approved contract have been corrected. (Informants and External expert belong to Categories E3-E5, not E5-E7 as written in the approved contract.)

LIFE-Nature 2003-31/1

PROVISIONAL INFORMATION ON PERSONNEL

Job position	Category A-F	Type of contract (permanent staff, long term contract, scholarship, etc)	Hourly rate (a)	Number of working hours assigned to the project (b)	Amount (c) (c = a x b)	Full time equivalent	New job created
Rangers (SE, FI)	D1, D2, D3, F3	Permanent	24	13 156	315 751	7.74	
Rangers (NO)	D1	Permanent	35	663	23 214	0.39	
Field workers	D1	Long term contract	24	3 424	82 164	2.01	
Genetic analyses	D1	Long term contract	21	4 913	103 183	2.84	0.84
Researcher 1	D4	Permanent	51	2 553	130 207	1.50	
Researcher 2	D4	Long term contract	27	2 629	70 972	1.55	1.55
Veterinary	D4	Permanent	23	2 886	66 386	1.70	
Administration	D4	Permanent	46	712	32 756	0.42	
Informants	E3	Permanent	21	780	16 378	0.46	
Informant	E4	Permanent	25	518	12 939	0.30	
External expert	E5	Permanent	28	609	17 045	5.07	
Project leader	F1	Permanent	39	4 690	182 904	2.76	
Ass. P.l. Finland	F1	Permanent	47	792	37 227	0.47	
Secretary	F1	Permanent	32	849	27 169	0.50	
Op. group leader Sweden	F3	Long term contract	33	4 912	162 095	2.89	
Op. group Sweden	F3	Permanent	30	1 316	39 472	0.77	
Op. group Finland	F4	Permanent	25	3 860	96 500	2.27	
				1 416 364	34	2.39	